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| APPLICATION NO.                                | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/799,444                                     | 03/12/2004  | Boyd T. Tolton       | LAMA122586          | 6250             |
| 26389  | 7590        | 08/25/2006           | EXAMINER            |                  |
| CHRISTENSEN, O'CONNOR, JOHNSON, KINDNESS, PLLC |             |                      | MALEVIC, DJURA      |                  |
| 1420 FIFTH AVENUE                              |             |                      | ART UNIT            |                  |
| SUITE 2800                                     |             |                      | PAPER NUMBER        |                  |
| SEATTLE, WA 98101-2347                         |             |                      | 2884                |                  |

DATE MAILED: 08/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary -**

Application No.

10/799,444

Applicant(s)

TOLTON ET AL.

Examiner

Djura Malevic

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/12/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**Response to Amendment**

The amendment filed 5/18/2006 was entered.

The declaration filed on May 18, 2006 under 37 CFR 1.131 has been considered but is ineffective to overcome the Nelson et al. (US Patent no. 6,750,453) reference.

The evidence submitted is insufficient to establish diligence from a date prior to the date of reduction to practice of the Nelson et al. reference to either a constructive reduction to practice or an actual reduction to practice. Where conception occurs prior to the date of the reference, but reduction to practice is afterward, *it is not enough merely to allege that applicant had been diligent*. Rather, applicant must show evidence of facts establishing diligence. Note, the record must set forth an explanation or an excuse for the inactivity; the Office *will not* speculate on possible explanation for delay or inactivity. Diligence must be judged on the basis of the particular facts set forth. See MPEP 2138.06 [and/or 715.07(a)] for detailed discussion of the diligence requirement.

**Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

*(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.*

Claims 1,2,5, 7, 11,12,13,15,16, and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Nelson *et al.* (US Patent 6,750,453 B1).

With regards to claim 1, Nelson discloses a method of detecting gases in the free atmosphere comprising traversing a target area with a gas correlation radiometer (GCR) tuned to detect the presence of ethane and identifying a gas leak upon a gas filter correlation radiometer (Col. 4, Line 59; Col. 1, Line 30++; Col. 21, Line 62).

With regards to claim 2, Nelson discloses detection along the wavenumber 2970 to 3005 $\text{cm}^{-1}$ , thus discloses the claimed wavenumber of 3000 $\text{cm}^{-1}$  (Col. 21, Line 6).

With regards to claim 5, Nelson discloses a gas filter correlation radiometer (Figure 1) comprising: a window 63 in a housing; optics defining a first 78 and second 76 optical paths between the window 63 and the detectors 82 and 86; a beam splitter 72 as part of the optics for directing radiation from the window 63 and dividing the radiation between two optical paths; wherein said optical paths comprise a first ethane and a second ethane optical paths being different in lengths and electronics 88 and 89 for processing signals from the detectors 82 and 86.

With regards to claim 7, Nelson discloses detection along the wavenumber 2970 to 3005  $\text{cm}^{-1}$ , thus discloses the claimed wavenumber of 3000 $\text{cm}^{-1}$  (Col. 21, Line 6).

With regards to claim 11, Nelson discloses an optical path provided with a gas filter containing ethane (Col. 10, Line 64++; Col. 21, Line 4; Col. 21, Line 62).

With regards to claim 12, Nelson discloses two optical paths with different lengths capable of detecting ethane (Col. 10, Line 64++; Col.21, Line 4; Col. 21, Line 63).

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With regards to claim 13, Nelson discloses two detectors 82 and 86 having collocated fields of view and sampling synchronously (Figure 1), (Col. 21, Line 62).

With regards to claim 15, Nelson discloses mounting the correlation radiometer on an airborne vehicle (Fig 19).

With regards to claim 16, Nelson discloses the gas leak located along a pipeline and detection of gas leaks is carried only using ethane (Col. 1, Line 30++).

With regards to claim 26, Nelson discloses a gas filter correlation radiometer (Figure 1) comprising: a window 63 in a housing; optics defining a first 78 and second 76 optical paths between the window 63 and the detectors 82 and 86 wherein, the detector section has corresponding pixels and collocated fields of view; and sampled synchronously. Nelson further discloses a beam splitter 72 as part of the optics for directing outside radiation from the window 63 and dividing the radiation between ethane optical paths, wherein two ethane optical paths are different lengths from each other and electronics 88 and 89 for processing signals from the detectors 82 and 86.

**Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

*(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.*

Claims 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson *et al.* (US Patent 6,750,453 B1) in view of Hodgkinson (International Publication WO 01/94916).

With regards to claims 3 and 8, Nelson discloses a method of detecting gas leaks as claimed in claims 1 and 5, and further discloses that the gas filters are configured for ethane, such that the optimized central wavelength and the optimized band-pass provides substantially increased sensitivity to ethane gas and substantially increases selectivity of ethane gas. Furthermore, Nelson discloses that the said filter consists of a specific band-pass and central wavelength, which avoids erroneous detection of any competitive gases (other than ethane). The said filter responds to wavelengths with a band corresponding to strong absorption by the specific target (ethane). Moreover, Nelson discloses filters for ethane comprising a band of 2970 to 3005  $\text{cm}^{-1}$  and a process for obtaining an ethane-optimal central wavelength to increased sensitivity to ethane as the target gas. Nelson does not expressly disclose the absorption peak at a bandwidth of 2850 to 3075  $\text{cm}^{-1}$  (Col.13, Line 61; Col. 21, Line 3; Col. 21, Line 62).

However, the absorption peak at a bandwidth of 2850 to 3075  $\text{cm}^{-1}$  is well known in the art. For example, a reference such as Hodgkinson (International Publication WO 01/94916) teaches an ethane absorption spectrum of 2815 to 3100  $\text{cm}^{-1}$  (Figure 2). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to include an absorption bandwidth such as that taught by Hodgkinson in order to increase captured signals which in turn provides additional sensitivity.

Claims 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson *et al.* (US Patent 6,750,453 B1) in view of what is old and well known.

With regards to claims 4 and 9, Nelson discloses the claimed invention according to claims 1 and 5 but does not expressly disclose the gas filter correlation radiometer tuned to detect ethane using an absorption peak at a bandwidth of 150  $\text{cm}^{-1}$  above or below 3000  $\text{cm}^{-1}$ . However,

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any specific band would have been an obvious matter of design choice. Since it is known in the art that a wideband would lead to increased sensitivity by increasing the captured signals, it would have been obvious to one skilled in the art at the time the invention was made to include a bandwidth of  $150\text{cm}^{-1}$  above or below  $3000\text{cm}^{-1}$  to further increase sensitive of the detector as is well known in the art. Additionally, it has been held that where the general conditions of a claim are disclose in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Claims 6, 10, 14, 18, 20, 24 and 25, are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson *et al.* in view of French (US Patent 4,676,642).

With regards to claims 6, Nelson discloses the method of detecting gas leaks and a gas filter as claimed in claims 5, but does not expressly disclose the beam splitter comprising a biprism. However, French teaches that partitioning may be accomplished in a number of ways including utilizing a biprism (Abstract). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to expressly include a beam splitter comprising a biprism such as that taught by French, since bprisms are known for partitioning light with great efficiency.

With regards to claim 10, Nelson discloses detection along the wavenumber 2970 to 3005  $\text{cm}^{-1}$ , thus discloses the claimed wavenumber of  $3000\text{ cm}^{-1}$  (Col. 21, Line 6).

With regards to claims 14 and 27, Nelson discloses the method for detecting gas leaks as claimed in claim 5 but does not expressly disclose using a pushbroom imaging technique. However, Nelson discloses detecting in a direction perpendicular to the ground surface while moving in an aircraft, thus it is obvious that Nelson is using a pushbroom technique. It is also

obvious that the pushbroom technique detects simultaneously as the field of view changes in time and/or in placement.

With regards to claims 18, Nelson discloses a gas filter correlation radiometer (Figure 1) comprising a window 63 in a housing, optics defining a first 78 and second 76 optical paths between the window 63 and the detectors 82 and 86, a beam splitter 72 as part of the optics for directing radiation from the window 63 and dividing the light between optical paths, ethane optical paths being different lengths from each other and electronics 88 and 89 for processing signals from the detectors 82 and 86. However, Nelson does not expressly disclose the beam splitter consisting a bi-prism. French teaches that partitioning may be accomplished in a number of ways including utilizing a biprism (Abstract). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to expressly include a beam splitter comprising a biprism such as that taught by French, since biprisms are known for partitioning light with great efficiency.

With regards to claim 20, Nelson discloses detection along the wavenumber 2970 to  $3005\text{cm}^{-1}$ , thus discloses the claimed wavenumber of  $3000\text{cm}^{-1}$  (Col. 21, Line 6).

With regards to claim 24, Nelson discloses a first optical path incorporating a gas filter containing ethane (Col. 10, Line 64++; Col. 21, Line 4; Col. 21, Line 62).

With regards to claim 25, Nelson discloses a second gas path length lower than first gas path length (Figure 1).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson in view of Smith et al. (US Patent 6,756,592 B1).



With regards to claim 17, Nelson discloses the method for detecting gas leaks as claimed in claim 1 but does not expressly disclose the gas leak detected as part of reservoir mapping process. References such as Smith *et al.* (US Patent 6,756,592 B1) teach high-resolution maps showing the distribution of gas leaks (Col. 3, Line 36) (Figure 1). Thus, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify Nelson to include the mapping system such as that taught by Smith because mapping gas leaks would increase the users understanding of the area being surveyed.

Claims 21, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson *et al.* in view of French (US Patent 4,676,642) and Hodgkinson (International Publication WO 01/94916).

With regards to claims 21, Nelson discloses a gas filter correlation radiometer (Figure 1) comprising a window 63 in a housing, optics defining a first 78 and second 76 optical paths between the window 63 and the detectors 82 and 86, a beam splitter 72 as part of the optics for directing radiation from the window 63 and dividing the radiation between optical paths, ethane optical paths being different lengths from each other, electronics 88 and 89 for processing signals from the detectors 82 and 86 and detection along the wavenumber 2970 to 3005  $\text{cm}^{-1}$  (Col. 21, Line 6). Nelson does not expressly disclose the beam splitter comprising a bi-prism and an ethane absorption peak at a bandwidth of at least 2850 to 3075  $\text{cm}^{-1}$ .

French teaches that partitioning may be accomplished in a number of ways including utilizing a biprism (Abstract). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to expressly include a beam splitter comprising a biprism such as that taught by French, since biprisms are known for partitioning.

Also, the absorption peak at a bandwidth of 2850 to 3075 $\text{cm}^{-1}$  is well known in the art. For example, a reference such as Hodgkinson (International Publication WO 01/94916) teaches an ethane absorption spectrum of 2815 to 3100  $\text{cm}^{-1}$  (Figure 2). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to include an absorption bandwidth such as that taught by Hodgkinson in order to increase captured signals which in turn provides additional sensitivity.

With regards to claim 22, Nelson discloses the claimed invention as claimed in claim 21 but does not expressly disclose the gas filter correlation radiometer tuned to detect ethane using an absorption peak at a bandwidth up to 150  $\text{cm}^{-1}$  above or below 3000 $\text{cm}^{-1}$ . However, any specific band would have been an obvious matter of design choice. Since it is known in the art that a wideband would lead to increased sensitivity by increasing the captured signals, it would have been obvious to one skilled in the art at the time the invention was made to include a bandwidth of 150 $\text{cm}^{-1}$  above or below 3000 $\text{cm}^{-1}$  to further increase sensitive of the detector as is well known in the art. Additionally, it has been held that where the general conditions of a claim are disclose in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

With regards to claim 23, Nelson discloses the claimed invention according to claim 21 but does not expressly disclose the gas filter correlation radiometer tuned to detect ethane using an absorption peak at a bandwidth of 150 $\text{cm}^{-1}$  above or below 3000 $\text{cm}^{-1}$ . However, any specific band would have been an obvious matter of design choice. Since it is known in the art that a wideband would lead to increased sensitivity by increasing the captured signals, it would have been obvious to one skilled in the art at the time the invention was made to include a bandwidth

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of  $150\text{cm}^{-1}$  above or below  $3000\text{cm}^{-1}$  to further increase sensitive of the detector as is well known in the art. Additionally, it has been held that where the general conditions of a claim are disclose in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Claims 28 -31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson *et al.* in view J. Sandsten, et al. ("Real-Time Gas-correlation Imaging Employing Thermal Background Radiation"; Feb 2000 Vol 6, No 4, Optics Express', p 92-103).

With regards to claims 28 – 31, Nelson discloses the claim invention except for using background radiation as a source of radiation to be detected. Sandsten teaches using background radiation in conjunction with gas correlation (Discussion and Conclusions, page 102). Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Nelson to include detecting background radiation in conjunction with gas correlation to identify gas leaks on the ground level.

#### **Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

*A person shall be entitled to a patent unless –*

*(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.*

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Zwick (US Patent 4,543,481).

With regards to claim 1, Zwick discloses a method of detecting gas leaks comprising

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traversing a target area with a gas filter correlation radiometer having a field of view oriented towards the target area, wherein the said radiometer is tuned to detect ethane and identifying a gas leak upon detecting the presence of ethane (Col. 1, Line 9 – 40).

**Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

*(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.*

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zwick (US Patent 4,543,481) in view of Hodgkinson (WO 01/94916).

With regards to claim 2, Zwick discloses the claim invention according to claim 1, but fails to disclose an ethane absorption peak at  $3000\text{cm}^{-1}$ . Hodgkinson discloses an ethane absorption peak at approximately  $3000\text{cm}^{-1}$  (Figure 2). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Zwick to include an absorption bandwidth such as that taught by Hodgkinson in order to increase the captured signals which provides additional sensitivity.

**Response to Arguments**

With regards to claims 1 and 2, the declaration is insufficient to establish diligence from a date prior to the date of reduction to practice of the Nelson et al. reference (See Above)

With regards to claims 3, 4, 8, 9 and 21-23, applicant suggests that Nelson uses well-known Hitran database (i.e. absorption bands) to measure concentration of ethane and applicant discovered a new larger bandwidth not known to the public in which discovering the optimal or

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workable ranges would not involve routine skill in the art. The examiner disagrees, since a reference such as Hodgkinson teaches a larger bandwidth than said Hitran database (3100 to 3817) and as such Hodgkinson teaches that it would involve routine skill in the art to discover workable ranges.

With regards to claim 6, 10, 18,20,24 and 25, applicants arguments, see Remarks, filed 05/18/2006, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made (See Above).

#### **Conclusion**


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Djura Malevic whose telephone number is 571.272.5975. The examiner can normally be reached on Monday - Friday between 8:30am and 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-24444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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